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What we're going to be talking about is the manual of how to demanufacture a personal computer and lamp recycling, and we'll be talking about how they go hand in hand. E-waste is the same as in any business where time is money, and what this manual is all about, basically, is saving you time. Employee training is a budgeted expense. If you're in the recycling industry, you know that you've got to constantly train your employees in the safe way to handle the material as well as how to manufacture, take the material apart. However, subsequent one-on-one retraining of employees, or the re-hiring and retraining gets very expensive and you get hit with unbudgeted costs. The quicker an employee is trained in their assigned task, the quicker that they are trained in their assigned task, the quicker they start producing the profit or amount of work that they're hired to do. Many e-waste employees have limited work skills, whether they've never had jobs before, whether they might be handicapped, maybe some type of disability, or maybe it's their first job. With this type of employee, additional training is needed. Another contributing factor to high cost in business is the training of a new employee because there's a high turnover, at least it is in the U.S.

As a tool to help control these costs, I would like to introduce, it's a manual that I wrote back in 2003, it's called how to demanufacture a personal computer. First published in 2003, latest edition is 2005. This is what the manual looks like. We'll be going over here, real quickly, briefly kind of what's involved with it, and that it's not a thought provoking, it's nothing revolutionary, it's a simple elementary step-by-step training tool. The illustrated guide is focused mainly on pictures vs. text, so again, if it's an entry level employee that has very limited skills, they're not intimidated by the new job that they're being assigned to, because there's a step-by-step photo guideline of how to do this. This frees up supervisory personnel to go and do other duties besides doing the one-on-one training with the new hire, or the follow-up with the employee that's brand new that needs additional. With a guide, once that they're initially trained in their job, it has a step-by-step of how you remove the parts from, not only computer, but on the monitor as well, so yes, it does free up that supervisor to oversee other duties that they're assigned. These are some sample pages, and right up here in this area (on slide), it's really kind of hard to see because of the graphic, but these are step by step photographs of where to pull wires off, where to pull cabling off, how to release the pressure on a CRT, what wires to cut here, as well as, it does have safety tips, for instance, what's in a computer and monitor in the way of the toxicities, this type of thing. What about all the different brands and models? Computers, as we all know, change as quickly as the price of gasoline. What it is this morning is already out of date by this afternoon, so a computer that you just purchased is going to be good for as long as you can keep it, of course, but if you go next week to buy that same computer, it's probably not going to be on the shelf. What this guide is all about, it's generic samples, because the basic fundamental of how a computer is assembled is pretty much the same regardless of the make or model. Same move with the monitors.

Where's the manual being used? It's being used at Linn-Benton Community College, it has been ever since its inception back in 2003, and this is in a work skills training class. This training class is focused on people that have never had jobs before, that just need to learn the concepts of how to work, like you don't throw things at your coworkers, or call them names, this type of thing. This is a very basic training class to teach people normal work skills in the workplace, and what they've done is they've set up a computer demanufacturing model, and they use this as a textbook. It's also used in numerous NGOs, non-governmental organizations, non-profits, throughout the U.S. as well as many for-profit companies, and recently, someone in Canada just purchased one of the manuals as well. In addition to being used at the college and in the businesses, United Nations University has a program called the STEP inititative, and this manual is being used within that STEP initiative, and STEP stands for Solving The E-waste Problem, and this is a UN program, and this is on a global scale. Along with the STEP, the European division of Hewlett-Packard, HP is currently using the manual, and some of their programs that they've established in

India and Africa, as well as, they purchased the European copyrights of the manual, so, in Europe, HP actually owns the book, and they can edit it, print it, sell it, do whatever they want with it. We have 20 manuals available at the conference, 15 are in Spanish, and 5 are in English. More copies are available by ordering at the special conference pricing, which we'll get to later on, plus shipping and handling. Now shipping, I can't give you the price on that, simply because of all the different locales and the different costs involved. So that has to be determined at the point of the order, but basically, the shipping cost is not marked up, it's whatever I get charged, that's what we charge the purchaser. I will have order forms back on the desk if you're interested.

What the manual does not cover is laptop demanufacturing. Laptops are just now really starting to come online, I've got to re-edit the book in the next year or so to include laptops, but laptops, while compact, they have basically the same items, except for one thing that PCs do not have, and this one particular item needs special handling to be recycled in a responsible manner. That's the fluorescent light that illuminates many of the flat panel screens, and if you've never seen what these look like, well before we get into that, these lamps contain mercury, mercury of course is a heavy metal, and classified as a hazardous material. This is what it looks like, and as you can see, this is a pencil, this portion right here is the lamp, this portion is the wiring that goes back to the ballast and the electronics to illuminate the lamp. In order to recycle a laptop in the most environmentally friendly manner, these lamps need to be removed. You just don't throw them in a shredder, because again, the small amount of mercury is released. Responsible lamp recycling is not only the proper thing to do, but it can lead to add-on business, so if you are thinking about going into the electronics business, recycling business, or you're already there, the way this leads into add-on business is the same companies that you're picking up the electronics from are very concerned about their environmental footprint on the world. They want all their materials handled in an appropriate manner. Recycling the lamps, they want that done correctly just like they do on electronics, and that basically, what we're going to go on to right now is recycling and risk management of end of life lighting products. What lamps are covered, collection options, lamp recycling process, downstream process, due diligence, and end market.

This is just a real quick overview of what all is involved, but as you can see, these types of lamps here all contain mercury. The larger ones, these are called HID, High Intensity Discharge, right in the center here, there's a huge ampule of elemental mercury, where there's mercury in regular fluorescents, the most compact fluorescents, all of these need to be handled in an appropriate manner. How much mercury does it take to make something toxic? The amount of mercury that's contained in 25 of these fluorescent lights, 25 is not that many. If these are broken in a 20 acre lake, what happens is very interesting. All the wildlife in that lake becomes unfit for human consumption. So the fish that's in there should not be eaten because they contain toxic levels of mercury. Question is, how much mercury is one of these lights? It varies by manufacturer as well as the date of the actual lamp itself, because now the green tip have less mercury than the ones that were made back in 1985. In 1985, yeah, some of them are still up there, they're very dim, but people are still using them, but that mercury is still there. And kind of a sidebar here, we've all, I think, broke these things in our garbage can, this type of thing, little white powder comes out, it makes a real nice poofing noise whenever they break, and if you break a bunch of them, they make a real bad bang noise, so essentially what happens is the phosphor powder goes up into the air, and there is mercury that's released, and so, if you're just simply breathing, not sticking your head down in there and going [inhale] like this, but if you're just breathing as you're breaking these, you're actually ingesting some mercury, and what most people don't realize is mercury is like lead, it is a heavy metal, and once it's ingested into your system, it builds up. You never get rid of the heavy metals once they're in your system. So it's best to limit these as much as you possibly can, so kind of an FYI, it's best not to break these.

As of February 2006, California passed legislation where it's now prohibited to dispose of lamps in the garbage stream, they must go to either a hazardous waste facility or a licensed waste handler that's going to handle these in the appropriate manner. Hazardous waste lamps are regulated under many individual state laws, such as RCRA, Bob (Tonetti) and Verena (Radulovic) talked about a while ago, and another one's called CERCLA, these are all U.S. laws, and again, down here's some examples of some different lights that contain mercury. A typical fluorescent light is composed of the phosphor coated glass tube with electrodes located at either end, with a very small amount of mercury that is in vapor form. Growing numbers of U.S. states are starting to regulate lamps, the lamp disposal, some of the ones that are already

have laws on the books are California, Connecticut, Florida, and these other ones, and many, in this portion right here, of course, mainly refers to the states, but it's, just like everything else, it's rapidly becoming a point of interest, as well as concern, because the toxicity that are in the lights. But as an e-waste recycler, be ready to have lamp recycling as an additional service that you can provide. Be ready with a downstream vendor that you've already hooked up doing business with, so you can handle mercury recovery. You don't have to handle the mercury recovery yourself. All you have to do is accumulate the lamps, and let the recycler that specializes in the mercury recovery do that. Be ahead of the competition. In the U.S., many, many, many of the e-waste handlers have now moved into the lamp industry, the lamp recycling. For instance, in California, it just simply makes sense, because you can't dispose of the electronics, they also have to be recycled through their Senate Bill 20 and 50 plan. Those same clients, they also have the light bulbs, those need to be recycled as well, they can't throw them away, so all of the sudden, they have got this add-on business. Think of it as you go into McDonalds, and I think most of us in the room have experienced this, all you want is a hamburger and a soft drink, and the clerk behind the counter goes, "You want fries with that?" And you walk out with fries, simply because it was suggested to you. Lamp recycling is the very same thing, when it comes to the e-waste customer. By the way, who's taking care of your lamps? Can we take care of those for you? It's just like the French fries at McDonalds, they just need to be suggested, and guaranteed, boom, it happens.

What are the collection options? The recycler can pick them up, the customer can deliver them to your facility, municipal collection events, which are very popular in the U.S., because now, again, with a lot of the e-waste events, there is lamp collection as well. In the U.S., we have pre-paid boxes, containers, where the customer actually purchases an empty box, it includes shipping of the box to them as well as the shipping picking it up and bringing it back to us for recycling. The one price includes not only that, but also includes the recycling of the material and a certificate of recycling when it's all done. Again, this program, because of transportation and other laws, etc, is only in the U.S. All collection options must comply with Department of Transportation, universal waste requirements regarding storage, package, and transportation. The lamp recycling process, once the materials are transported to a lamp recycling facility, what you see right up here, these are the aluminum ends that are on the end of the fluorescent light, these are the lights that are intact here, these have already been separated. Items are separated and disassembled, through, it's a closed system that captures the vapors as well as the phosphor powder. Any hazardous materials are safely removed and handled appropriately. Virtually all parts are recycled. The cardboard boxes that the lamps are in, of course you've got cardboard recycling, so that's a good resale item for you, as well as the glass, once it's melted down, the aluminum, the copper and the steel. All of those have reuse market, so this, a fluorescent light becomes a commodity again because of the raw products that are involved.

This (on slide) is the lamp crushing machine here. Lamps go in, it is a closed system like I said, and very quickly, the lamps are separated into their components. The phosphor powder goes one way, the glass goes another, the metal goes another. The phosphor powder is vacuumed off, and again, this is where the mercury's contained, it's dried into a powder, and the way it gets dried into a powder, you see these trays that they're in, the machine's called a re-tort, and it goes into the re-tort, re-tort heats it up to a little bit over 800 degrees, and what happens is, at that point, mercury becomes a vapor again. Once it's a vapor, it's then collected like in a distillery process, like a still, and this vapor's collected and it's cooled, becomes a liquid again, and then it comes out the other end again, like the neighborhood still produces moonshine, the liquid comes out the end, it's captured, the liquid mercury, it's captured in about a 1 ½ L lead bottle, and when it's filled, it weighs between 80 and 100 lbs, and it's keeping all of that out of the environment. That mercury then goes back into the mercury commodity market for re-use. As I mentioned, the mercury is removed from the lamps, and it's purified. Metal parts are separated, and that goes to the aluminum market and steel market, because the steel pins that are in it, and this is a typical flow of material. The customers who generate the lamps transport the material to a demanufacturing site, such, of course, as ours, and that we have our own trucks to handle domestic pickups, this type of thing, in large amounts, it goes to our facility, they then go to a lamp demanufacturing, where, once again, it's broken out into the three particular flows of material, the phosphor powder and mercury go into one, glass goes into another, and aluminum endcaps go into another. All these go to a secondary market. Once the phosphor powder goes to the re-tort, what happens to that is it becomes inert, and then that is now non-hazardous material, and unfortunately, the lamp manufacturers do not want this phosphor back. They want to have their own

phosphor mixture in their own lamps, so there is, at this time, no real market for the phosphor re-use, but again, it is totally non-hazardous at this point, and then it goes to a proper disposal landfill. That's the flow of how the lamps do work. The downstream process, every three years, our downstream vendors are audited. Liquid lamp mercury, triple [unintelligible] by permanent environmental company, phosphor powder, it goes to the TCLP analysts, analysis for mercury, as well as is it a class 1 permanent secure landfill, lamp glass, mercury free, used in the manufacturing of fiberglass and other things, and the aluminum endcaps, secondary metals market, once again, it becomes aluminum, so it could be your next six-pack of Coca-Cola, or your next Hyundai automobile, go down the street, you never know what that aluminum is going to be. The recovery service provider must perform due diligence on those downstream vendors to make sure this material is handled in an appropriate manner. While this makes a good photo op right here. You can see this motorcycle rider here busting through this huge wall of fluorescent tubes, make a huge kaboom sound. Really, if we had a box of them, and we dropped them up here, and they all broke at one time, I guarantee everyone in there would jump, because it would be so loud. But while this was a great photo stunt, and what happened as an end result of this is there was a hazardous spill that had to be cleaned up because of all the mercury that was released during this particular stunt. So make sure, if you are going to be going into this, how your lamps are going to be recycled. Don't let him be doing this with them. A service provider should be able to provide you with procedures for the demanufacturing, the disposal, waste handling, and the storage. There's nothing proprietary about that. They should share all that information with you.

Things to look for in a recycler. Experience and expertise, very, very important. How long have they been in business? Do they really know what they're talking about. The chain of custody: are they providing to their customers complete cradle to grave chain of custody, when it goes to their facility, what happens to it? What happens to each one of those end products? Environmental protection, is this company truly concerned about protecting the environment and the way they handle this material? Financial safeguards. Financial safeguards in the way of, are they going to be in business tomorrow, or is the regulator going to be coming after you because you shipped the materials, and now it's sitting there, and all of the sudden, it becomes your material again? High levels of insurance: does this company have high levels of insurance that are going to protect, not only that company, but their customers as well from accidents? Is it a true recycler, or is it just a broker of materials? Are they adhering to all regulations? Do they have all the necessary permits from their local, their state, or their federal requirements? They should show you all of this stuff. There are no secrets, once again, in this business. It's right up front, they should be totally transparent. Do they have a materials tracking system for tracking transport and processing, and the reclamation of the material? Cradle to grave accountability: they take those lights in, okay, what happens to that glass, what happens to those endcaps, what happens to that mercury? It should be all right there for you to review. Do they have a closure plan, if that's required? Some municipalities require closure plans, okay, this business is going to close tomorrow, what about the cleanup for the mercury and the other materials they might be handling there? Again, high levels of insurance, you're going to see this quite a few times throughout this. Do they have knowledge of the regulations? Do they retain an environmental attorney? Do they have a certified environmental consultant on their payroll? Both of these things are very, very important, simply because as you're all sitting here, you've been listening to all these regulations, and some of these regulations weren't here last month, but they're here now, so you need someone that's going to stay on top of all this to keep your company compliant.

Does the company that you're doing business with, this recycling, do they train their employees, and do they certify them in hazardous material handling, communication, OSHA, all of these other types of certifications that are out there to ensure that these employees know what they're handling, and they're handling in an appropriate manner. Do they have safety meetings in their facilities? Do they medically monitor their employees? What's that all about? Well, keep in mind, these lamps are being broken there. These employees are being exposed to some type of mercury vapor. It's very minimal, because again, it's a closed system, but it's still there. So are these employees, is their health being taken care of? Are they monitored on a regular basis? Again, these are questions that you need to ask if you're going to be going into this business of your downstream vendor. Do they provide consulting support and subcontractor training for handling and storage of the lamps? Again, things to look for: recycling permits, state and federal. Do they have a clean compliance record, or do they have a list of violations that are this long because they simply do not abide by the regulations or the laws? Do they provide the chain of custody,

documentation? Is their mercury recovery facility, does it have the proper governmental approval? Again, do they have their permits, are they inspected regularly? Do they take care of their customers? Do they indemnify their customers of any accidents that the recycler may have, so it doesn't go back on you, the customer? Again, closure plans were required, strong financials, and a minimum of $5 million pollution liability insurance. Essentially, what this is, if our truck has a wreck going down the I-5, we have a hazardous waste spill, that spill stops with us. It doesn't go back on you as the customer, because you generated those light bulbs to us. It stops with us.

Here's a real quick kind of universal waste handling of the material. Employees must have leather gloves or the equivalent; eye glasses with side shields, in case these lamps break, and of course, they do occasionally; or full face shield, safety toes and boots, the lamps need to be placed in a new or used lamp box, the egg crates are going to have to be put back in there, you can just put as many lights as you can, it becomes very solid, and then each end just has to be taped up. It doesn't have to be air-tight, sealed, it just has to be taped up in case the box falls over and breaks, the breakage is contained there in that cardboard box. Badly damaged boxes and wet boxes cannot be accepted for transport because of the risk of accident probability on the truck, and for instance, if you've got a full semi load of these going down the highway, and the boxes are in bad condition, it can set off a chain reaction. Let's say 4-5 boxes are in bad shape, and they collapse, they implode, because it's on a vacuum, but this chain reaction then starts setting off multiple chain reactions. There's enough force that will literally suck in the sides of that tractor trailer rig. Completely, just like all the air was sucked out of it. So this is the reasons why the boxes have got to be good for transport. They need to be palettized to maximum, about 6 ft. high, boxes need to be secured with shrink wrap or stretch film so they don't fall off. All palettes, again, this U.S. regulation, need to be labeled as used Mercury Lamps, or Universal Waste Mercury Lamps.

This right here (on slide) is very important, and in fact, not only in the handling of light bulbs, and I would suggest this in your e-waste: the employee must wash their hands with soap and water from beginning the workshift, before a break, and a completion of the work shift. Proper use of safety equipment needs to be provided for all the employees, potential danger of contamination of mercury, no tobacco, food, beverages, are permitted in the work area with the mercury labs. We also have that rule in our e-waste division, simply because, if, for instance, the employee smokes, and they reach in their pocket without washing their hands, pull out a smoke, and they've got contamination on their hands, it goes right to their lips. Same way if they've got a drink out there, the dust, whatever's being generated, falls on the drink, so it's best not to have any of that material in the work area, and they're washing their hands constantly any time they leave that work area. Before they go to the bathroom, they wash their hands. After they go to the bathroom. This is a very, very, very strong suggestion I would pass on to you.

This is my contact information, the price of the manual for the conference is $39.95, or $40, U.S. Dollars, regular price is normally $49.95 plus shipping and handling. If the books are sold out, and they're ordered, they will get the special conference pricing up to December 20th. So, any questions?

[Spanish Male Speaker]
Hola, buenas tardes. Soy Antonio Salguero de la empresa SARRE de Jalisco. Te quería hacer una pregunta: para que sea viable esa empresa que tú manejas, cuántas toneladas manejan por mes, por año, para que sea redituable el reciclado de estos productos.

[Greg Sampson]
You're referring to the lamps?

[Spanish Male Speaker]
Las lámparas, o sea, cuántas toneladas de lámparas por día tienen que procesar para que sea autosuficiente la planta de ustedes.

[Greg Sampson]
Actually, I don't have that number, but what I can tell you is, last year, we processed over 25 million lamps at our Phoenix facility, and we have six locations around the U.S. that all ships to this particular location for the processing of the mercury.

[Spanish Male Speaker]
¿Todas son de reciclado del consumidor final que son, en general, las viviendas, casas, almacenes? ¿O cómo hacen ustedes la recolección de esos materiales, tienen algún sistema de recolección, centro de acopio?

[Greg Sampson]
Okay, the material that we collect, it comes to us from residents actually bringing us the material to our six facilities, or we do have different contractors, for instance, electrical contractors that go in and change out the lights, they'll actually bring them to our facility, or for the large commercial accounts, such as Wal-Mart and Boeing and some of the other ones like that that produce a large number of lights, we have our own trucks that go pick those up. And what was the second part of your question?

[Spanish Male Speaker]
Sí. ¿Qué volumen era el que necesitan generar diariamente para que sea viable y qué sistema tenían para hacerse llegar las lámparas? ¿Y si es únicamente por grandes distribuidores o también están recibiendo las de las casas-habitación?

[Greg Sampson]
Yes, we receive the lamps from everybody, basically whoever has a lamp, we take it from them. And then, again, as far as the numbers on what makes it profitable at what point, I couldn't tell you that. I'm sorry.

[Spanish Male Speaker]
Okay, thank you, gracias.